



Team Submarine FY20 Small Business Sustainment Technology (SBST) Virtual Showcase

**TEAM SUB DAC | NAVSEA 00K
16-17 September 2020**



Administrative Message:

**Angelle Dent-King
Team SUB DAC Office
Acquisition Analyst**

Moderator:

**Patricia “Anne” Bannister
Director, SEA 00K**

Facilitator:

**Angelle Dent-King
Team SUB DAC Office
Acquisition Analyst**



Welcome Message / Opening Remarks

Rear Admiral Edward Anderson Team Submarine, In-Service (SEA 07)



Key Note Speaker

Mr. Jimmy Smith
Director, Office of Small Business Programs
Department of Navy



Department of the Navy Office of Small Business Programs

How Small Businesses Fit In Support of the Department of the Navy

***TEAM SUB Small Business
Sustainment Technology Showcase***

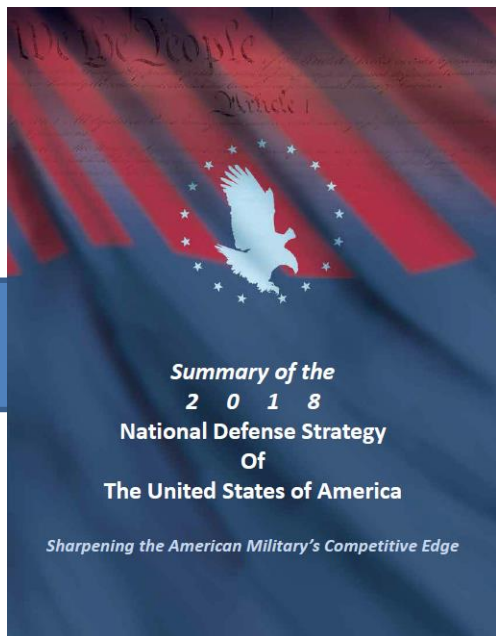
**Mr. Jimmy D. Smith
Director
Office of Small Business Programs**

***“Small Business...
The First Option”***

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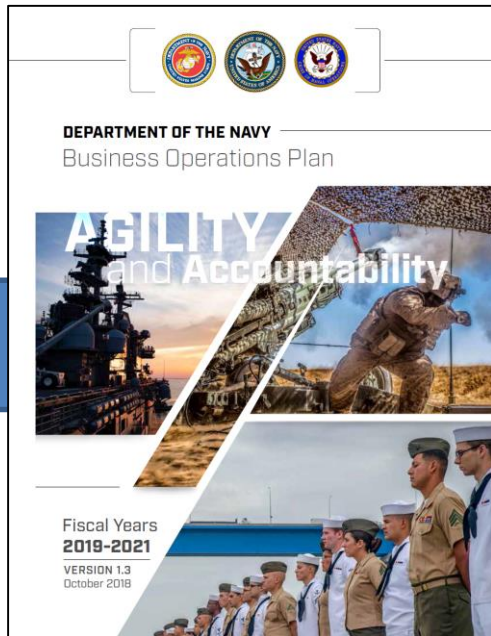
Strategic Alignment

Department of the Navy Office of Small Business Programs



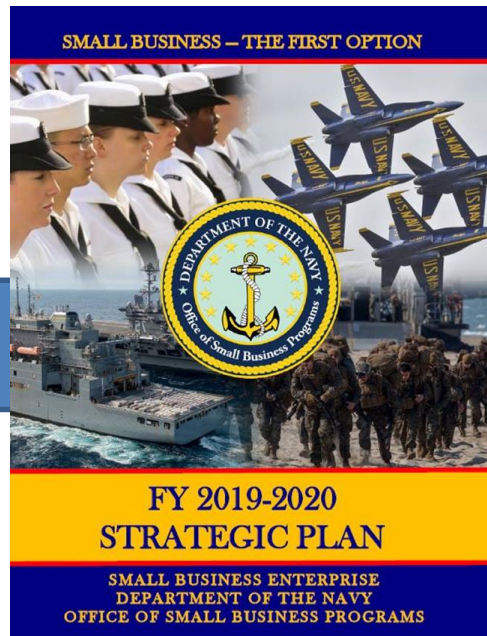
Three Lines of Effort

1. Lethality
2. Strengthen Alliances
3. Greater Performance and Affordability



Three Priorities

1. People
2. Capabilities
3. Processes



Three Focus Areas

1. People
2. Capabilities
3. Processes



Defense Industrial Base Challenges

Department of the Navy Office of Small Business Programs



- NDIA Vital Signs 2020 – The Health and Readiness of the Defense Industrial Base (DIB)
 - NDIA report graded the DIB a “C” grade.
- Small Business and the Office of Small Business Programs can decrease the gap in four specific areas:

Gap	Mitigation Strategy
Innovation	Focus on SBIR (awards & research) demand signals
	Perform outreach with focus on transition of R&D projects
	Maximize the use of existing programs and authorities
Production Inputs	Monitor industrial workforce and identify trends to assist/counsel small businesses in procurement readiness
	Monitor demand signal and communicate to industry
Supply Chain	Assist with Market Research
	Identify and help break down barriers of entry
Political and Regulatory Conditions	Continue to enhance small business legislations
	Perform town halls, Congressional engagements, etc.



Long Range Acquisition Forecast

Department of the Navy Office of Small Business Programs

Unclassified

Pages - Home x +

secnav.navy.mil/smallbusiness/Pages/default.aspx

OFFICE OF SMALL BUSINESS PROGRAMS

Home About Commands Outreach Performance Doing Business with DON Search What DON Buys

Home

10 Steps to Becoming Procurement Ready
DoD Procurement Toolbox
Find your Small Business Professional
Governance of The DON'S OSBP, SBIR and STTR Programs
Long Range Acquisition Forecasts (LRAF)
Mentor-Protege Program
NIST SP 800-171 - Cybersecurity
Procurement Technical Assistance Center
Recent Briefings
Resources
SAM Entity Administrator Letter
SBA
SBDC
SBIR / STTR
SeaPort-e
Small Business Career Guidebook

Coronavirus Details

Subscribe to our mailing list

COVID-19_Home_...png Pages - Home.html

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5:03 PM 8/16/2020

<https://www.secnav.navy.mil/smallbusiness>



Buying Commands

Department of the Navy Office of Small Business Programs



U.S. Marine Corps Installations and Logistics
(HQMC I&L)

www.iandl.marines.mil

703-604-3656



Ground Equipment



Marine Corps Systems Command
(MCSC)

www.marcorsyscom.marines.mil

703-432-3946



Ground Weapons and IT
Systems



Naval Facilities Engineering Command
(NAVFAC)

www.navfac.navy.mil

202-685-9129



Construction and Facilities



Strategic Systems Programs
(SSP)

www.ssp.navy.mil

202-433-7857



Strategic Weapons Systems
(Missile Systems)



Naval Supply Systems Command
(NAVSUP)

www.navsup.navy.mil

717-605-1663



Majority of Navy Buys, Services,
material, logistics, maritime,
aviation spares, etc.

<https://www.secnav.navy.mil/smallbusiness>

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Buying Commands cont'd

Department of the Navy Office of Small Business Programs



Military Sealift Command (MSC)

www.msc.navy.mil/business

757-443-1435



Naval Air Systems Command (NAVAIR)

www.navair.navy.mil/osbp

301-757-9044



Naval Information Warfare Systems Command (NAVWAR)

www.spawar.navy.mil

619-524-7701



Office of Naval Research (ONR)

www.onr.navy.mil

703-696-2607



Naval Sea Systems Command (NAVSEA)

www.navsea.navy.mil

202-781-2061



Ocean Transportation



Aviation



**Information Technology/
Communications**



**Research and
Development
(SBIR/STTR)**



Shipbuilding



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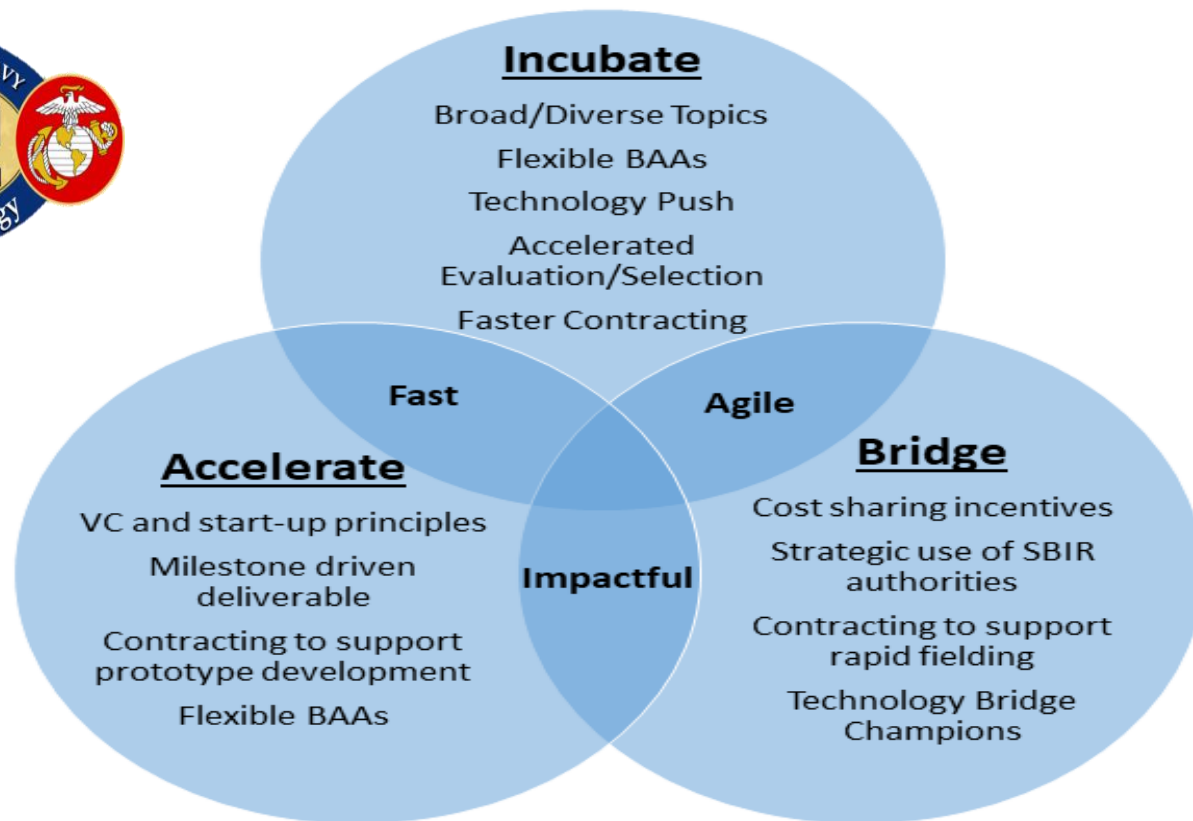
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Increase Greater Returns from the SBIR/STTR Program

Department of the Navy Office of Small Business Programs



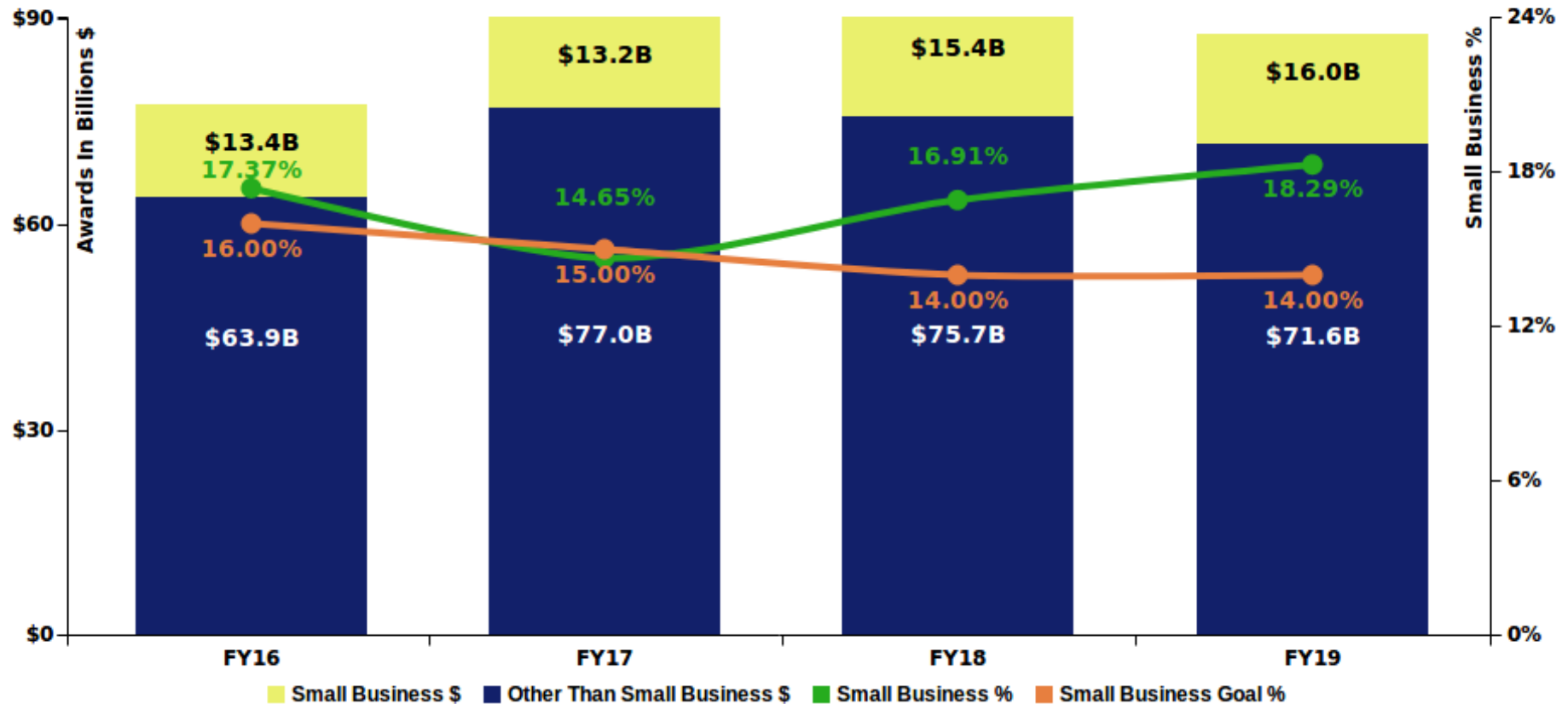
Department of the Navy
Office of Small Business Programs

-
- The Department of Defense (DoD)
Mentor-Protégé Program
- The Mentor-Protégé Agreement is between Mentor and Protégé and administered by a DoD agency.
- Mentor (Large Business)**
- Protégé (Small Business)**
- Market Competition**
- Products & Service costs**
- Other Large and Small Businesses**
- Other Large and Small Businesses**
- Better, Affordable Niche Products & Services**
- Government & Warfighter**
- Federal Contracts**
- Mentor and Protégé's Products and Services**
- Business Development**
- Soft & Hard**
- Knowledge & Training**
- Technology**

Total and Small Business FY16-FY19 Award Trends

Department of the Navy Office of Small Business Programs

Navy Overall and Small Business



Data for FY16, FY17, and FY18 are all from validated datasets, FY19 data is as of 30 September 2019

<https://www.secnav.navy.mil/smallbusiness>

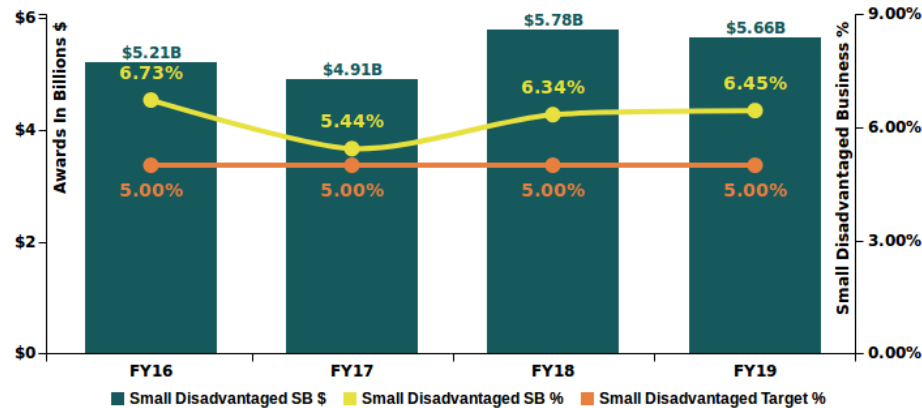
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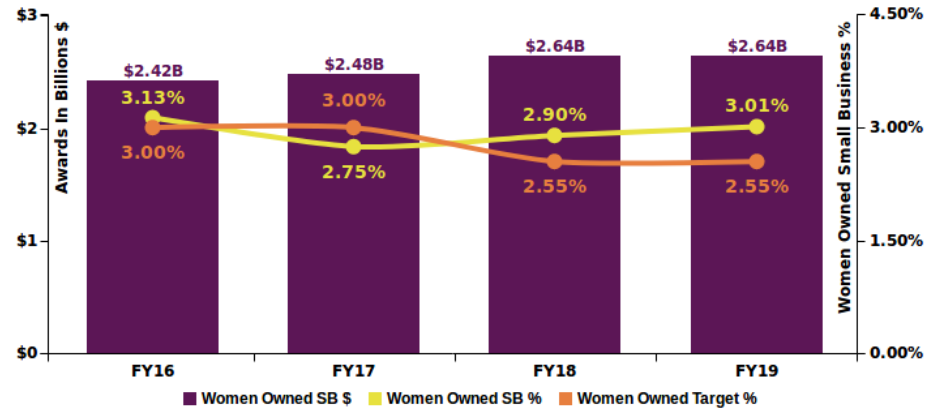
Socioeconomic Group FY16-FY19 Trends

Department of the Navy Office of Small Business Programs

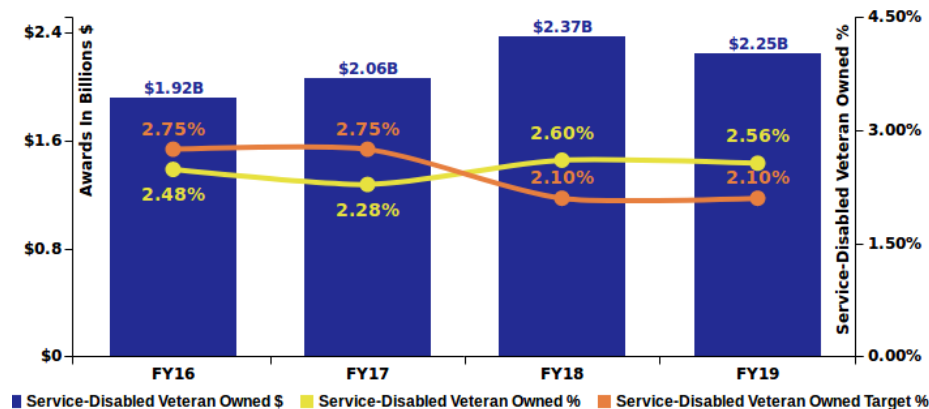
Small Disadvantaged



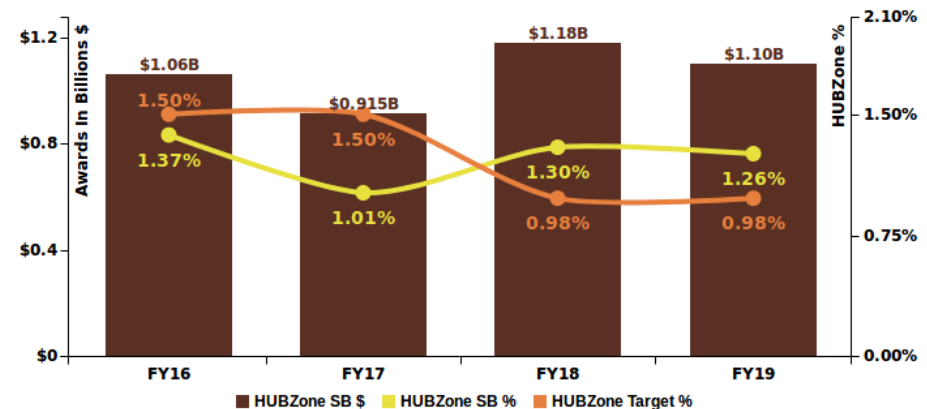
Women Owned Small Business



Service-Disabled Veteran Owned



HUBZone



Data for FY16, FY17, and FY18 are all from validated datasets, FY19 data is as of 30 September 2019

<https://www.secnav.navy.mil/smallbusiness>

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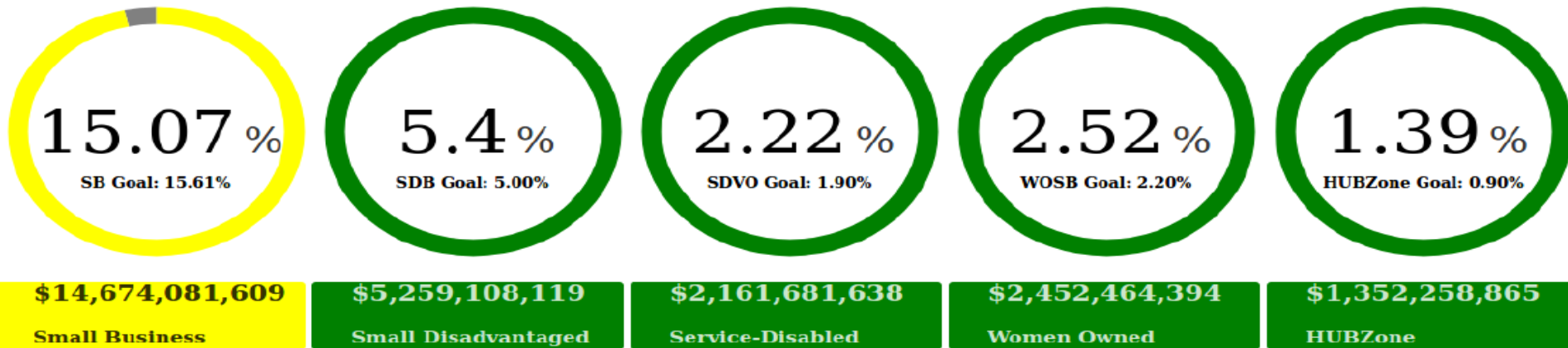




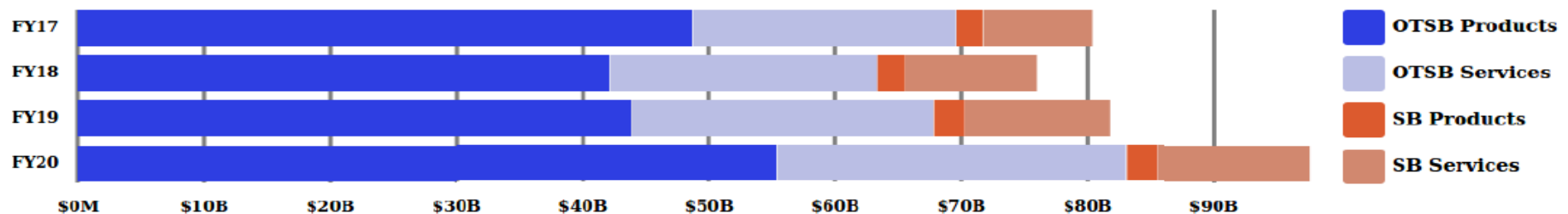
Department of Navy

Fiscal Year 2020 FPDS-NG Data as of 14 September 2020

Top Fiscal Year 2020 Year-to-Date Small Business Portfolio Group Spends



Fiscal Year 2017, 2018, 2019, and FY20 Year-to-Date Prime Contract Awards through 14 September 2020



Get Connected

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@DON_OSBP



facebook.com/NAVYOSBP



<https://www.youtube.com>

DON Office of Small Business Programs Channel



[/deptofnavysmallbusiness](https://deptofnavysmallbusiness)

<https://www.secnav.navy.mil/smallbusiness>

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Team Submarine Directorate Overview

Mr. Michael Breslin
Executive Director
Undersea Warfare Directorate



SEA 07 Portfolio

Undersea Warfare Directorate

Mr. Michael Breslin

Executive Director, SEA 07B

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SEA 07 Portfolio

SEA 07 RDA Portfolio Review 8/27/20



SUBMEPP



PMS 392
In-Service
Submarine & Inac

VSCOT



NEXTGEN FFT



07TR
Submarine
Training

PMS 399
Undersea
Mobility



SEA 07Q
Quality Assurance
(SS, DSS & FBW)



PMS 391
Submarine
Escape &
Rescue

SEA 07L
Logistics

**USE RCB;
MTBF, MTTR,
MLDT, LCSP, SBP**

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SEA 07 Portfolio Agenda



Front Office

- Mission/Priorities
- Budgeting
- Cost Control
- Personnel Development
- Contracting

PMS 392

SSN 688 Class

- Gate 7

VIRGINIA Class

- Cert Improvement

SSBN/SSGN

- Service Life

PMS 391 Undersea Rescue

- SRDRS
- SRFCS

PMS 399 Undersea Mobility

- DDS Modernization
- Unmanned vehicle support

07TR Submarine Training

- Training Devices
- Curricula & Learning Channel Videos

07Q Quality Assurance

- Certification and Functional Audits

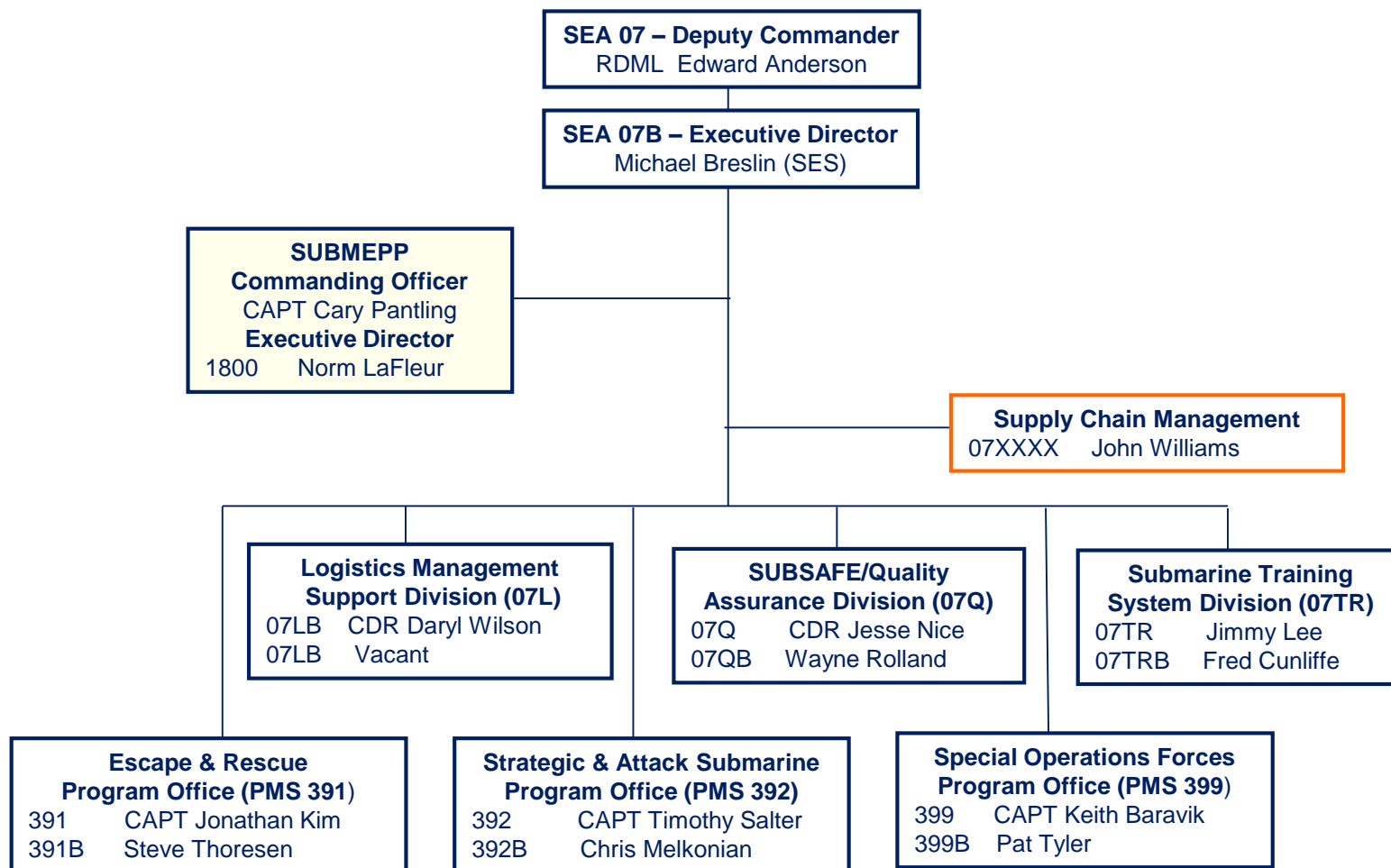
07L Submarine Logistics Support

- Lifecycle Sustainment Lead
- Competency Support - PSMs

\$790M total SEA 07 portfolio in FY20 (PB21 controls as of January 2020)

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Organization Chart



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TEAM SUB Goals & Priorities



SEA 07 RDA Portfolio Review 8/27/20

Critical Enablers:

- Develop an agile and capable workforce
 - Focus faster hiring, targeted development and retention activities to align skills needs while eliminating cumbersome processes
 - Teach and lead our teams to accelerate warfighting delivery with manageable risk
 - Develop strategic succession planning and knowledge management
- Maintain alignment as Team Submarine
 - Leverage inclusion, team learning and process efficiencies across Team Submarine
 - Establish / maintain relationships with our Allies for technology exchange

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PMS392 Focus Areas

SEA 07 RDA Portfolio Review 8/27/20

VACL Supportability

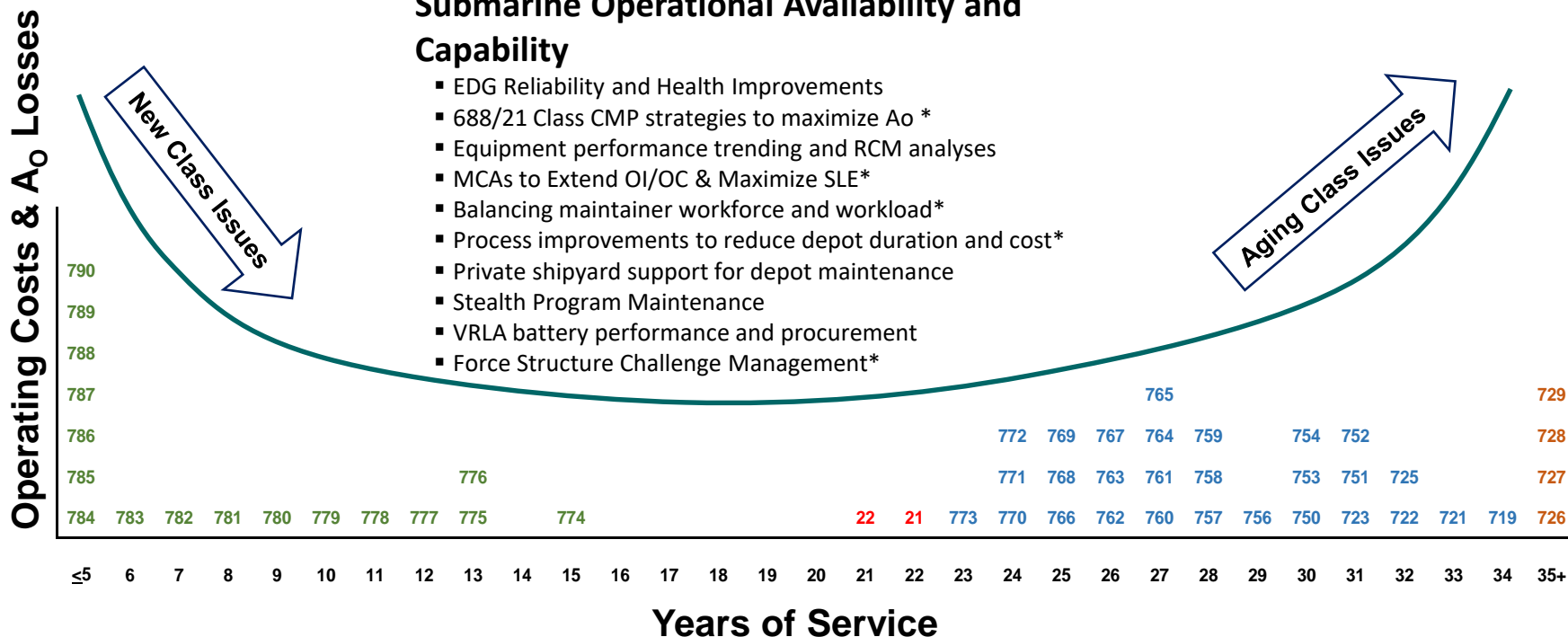
- New design and construction lessons learned*
- ISEA Management*
- Logistics Support *
- Modernization based on technology half-life
- Modernization for reliability and maintainability*
- Back-fitting Block-evolution and Acoustic Superiority*

SSBN/GN Sustainment

- CMP strategy to best balance ops and maintenance*
- OHIO Class 42-year Service Life
- SSGN OFRP management
- Modernization for aging / obsolescence (HME)*
- Modernization for capability (NPES)*
- TRIPER Program management*

Submarine Operational Availability and Capability

- EDG Reliability and Health Improvements
- 688/21 Class CMP strategies to maximize Ao *
- Equipment performance trending and RCM analyses
- MCAs to Extend OI/OC & Maximize SLE*
- Balancing maintainer workforce and workload*
- Process improvements to reduce depot duration and cost*
- Private shipyard support for depot maintenance
- Stealth Program Maintenance
- VRLA battery performance and procurement
- Force Structure Challenge Management*



* These align to TEAMSUB Actions Items and Cross NAVSEA organizations

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SEA 07TR

SEA 07 RDA Portfolio Review 8/27/20

Jimmy Lee - Director
Fred Cunliffe - Deputy Program Director
2 Financial Analysts
7 Program Analysts

SBT/ISPAN



C4I MRTS



Training Device
Procurement
Installation
Modernization
Life Cycle Support
NAVSEA Curricula
Submarine On Board Training

VSCOT



PSET



NEXTGEN FFT



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Submarine Rescue Systems PMS 391

SEA 07 RDA Portfolio Review 8/27/20

SRCFS

SRDRS

SRC

In Service

AUWS

In Service

PRMS

In Service

TUP

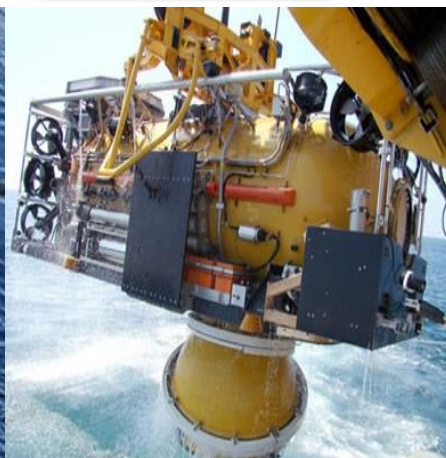
In Service



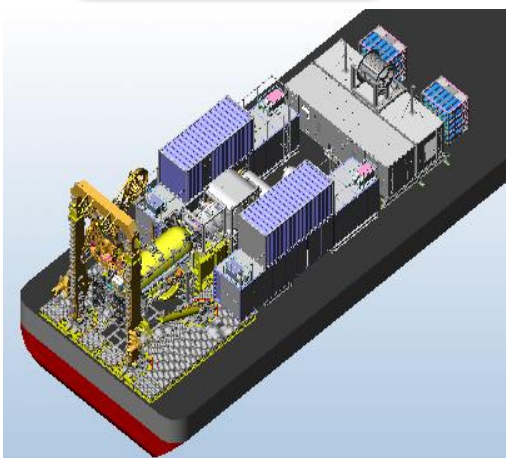
IOC 1940's
Shallow Water Rescue
Capability



IOC 2017
Intervention Capability



IOC 2008
Deep Water Rescue
Capability



IOC 2019
Recompression/Decompression
Capability

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UNDERSEA MOBILITY PMS 399

SEA 07 RDA Portfolio Review 8/27/20

- The mission of NAVSEA PMS399 is to coordinate research and development, acquisition, test and evaluation, and in-service support of Dry Deck Shelters (DDS), SOF Designated Submarine Systems, and future SOF undersea mobility systems
- SOF Assets include:
 - Four SSGN Submarines
 - Six SOF VA Class Submarines (Four Primary and Two Back-up)
 - Six DDS
- TOA: FY21-25 = \$212,097K
 - \$152,127 SOCOM/WARCOM Funded (PROC, O&M, and RDT&E)
 - \$51,654 Navy Funded (O&MN and OPN)
- Key Personnel
 - CAPT Keith Baravik, PMS399
 - Pat Tyler, PMS399B
 - Vacant APM, PMS399A1
 - Tommy Beals, PMS399A2
 - Vacant APM, PMS399A5
 - Mark Umholtz, PMS399TD



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Team Submarine Directorate Overview

Mr. Nidak A. Sumrean
Executive Director
Submarines



PEO SUB Overview

16 September 2020



TEAMSUB Mission & Priorities

Team Submarine Mission:

Keep America's Navy #1: Deliver and sustain reliable and affordable undersea warfare capabilities and readiness

Team Submarine Vision:

Team Submarine will exercise rigor, innovation and sustainment to maintain readiness and the U.S. Navy's undersea superiority

Priorities:

- Maintain continuous strategic deterrence
 - Deliver the COLUMBIA Class on time at an affordable budget
 - Sustain the OHIO class through end of life
- Maximize warfighting availability and lethality of undersea forces
 - Execute VIRGINIA class Block IV recovery plan to sustain 2/year
 - Increase undersea force A; drive affordability into all submarine classes' life cycle sustainment plan
 - Expand investments to maximize the rapid fielding of transforming sensors, weapons and payloads through full spectrum of warfare
- Deliver integrated warfare in a secure, cyber resilient, common architecture

30



PEO Submarines Portfolio

17 ACAT Programs

- 1 ACAT I
- 3 ACAT II
- 11 ACAT III
- 2 ACAT IV



PMS XXX
SSN(X)

PMS 394
Advanced
Undersea
Systems

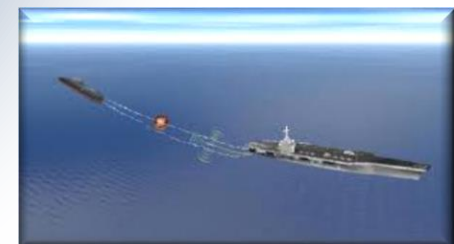


PMS 450
VIRGINIA
Class Submarine



PMS 404
Undersea
Weapons

PMS 415
Undersea
Defensive
Weapons



SEA 073
Undersea
Technology



SWFTS

PMS 485
Maritime
Surveillance
Systems



PMS 401
Submarine Acoustic
Systems

PMS 425
Submarine Combat and
Weapons System

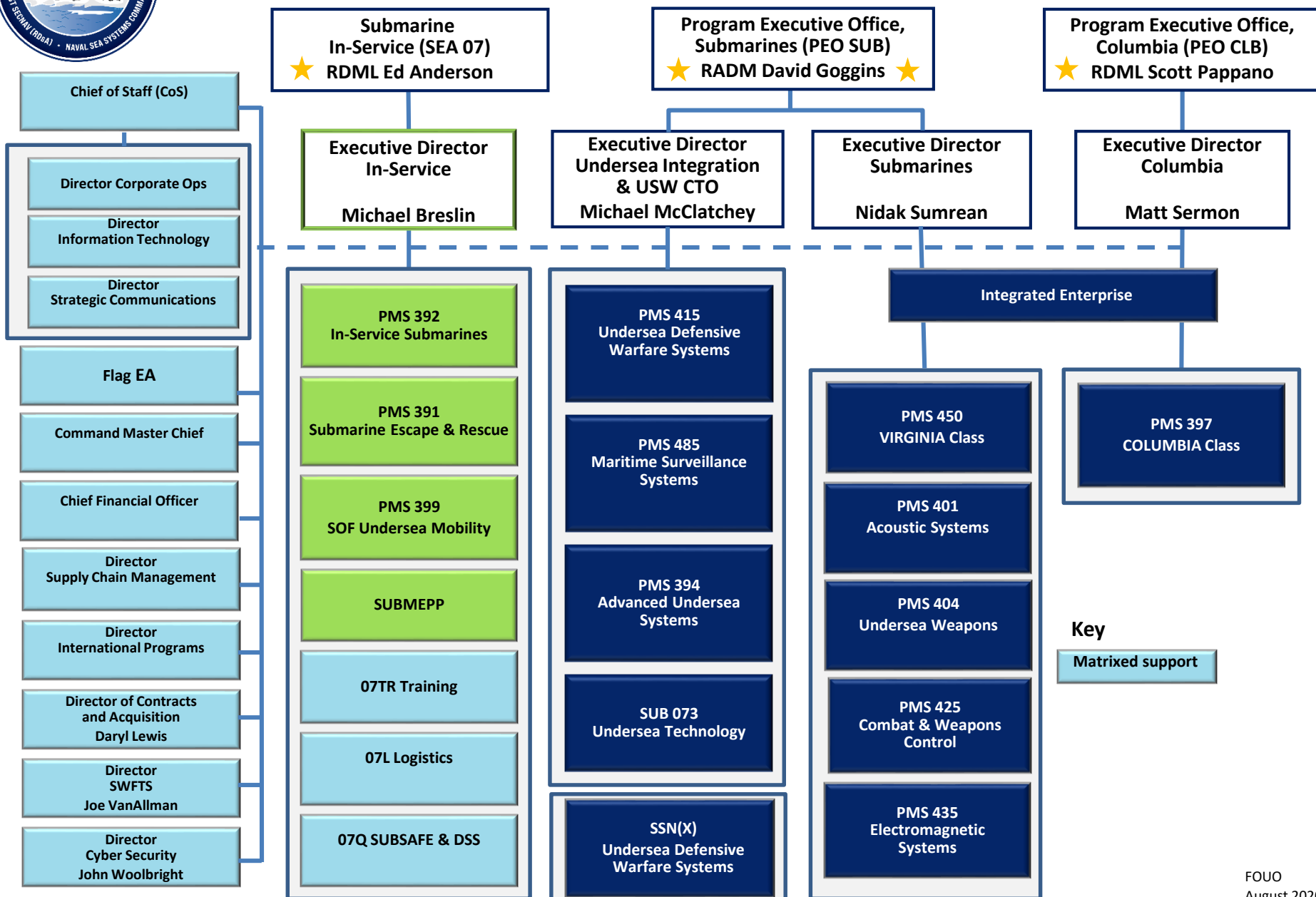
PMS 435
Submarine
Electromagnetic
Systems





Team Submarine

In-Service Directorate, PEO Submarines & PEO Columbia





Small Business Investment Areas

- Sonar, Combat and Torpedo Capability
- Weapon Payload Control
- HF Stimulation
- Common Acoustic Cabinet
- Acoustic Intercept and Ranging
- Combat Systems of the Future
- On-Board Team Trainer
- Information Automation
- Technology Infusion
- Information Assurance
- Weapon Launchers and Simulators
- Program Management Support
- Unmanned Capabilities
- Payload Technologies
- Sensor Technologies



PEO SUBS: \$13.6B organization
-Unmanned capabilities, information automation, cyber, and payloads have recently had increase in focus from innovation standpoint.



PEO SUB SBIR Transitions

**PEO SUB > \$1.5B in
Phase III Investment**

**Cardinal Engineering / Weidlinger
Associates**
Shock Analysis

www technologies
Ship Control Architecture

CCSM
Planning Systems Inc
GCCS Development &
COTS Applications

DSR
Advanced Information Systems
Software Migration Legacy Trainer
Photonics Mast Workstation

Rite Solutions
Mission/engagement planning s/w

Progeny
Audio Signals
Active Emissions
Information
Assurance
AN/WLR-1 AI&R
Manning Reduction

Trident Systems
Mobile Computing for
Submarine Applications

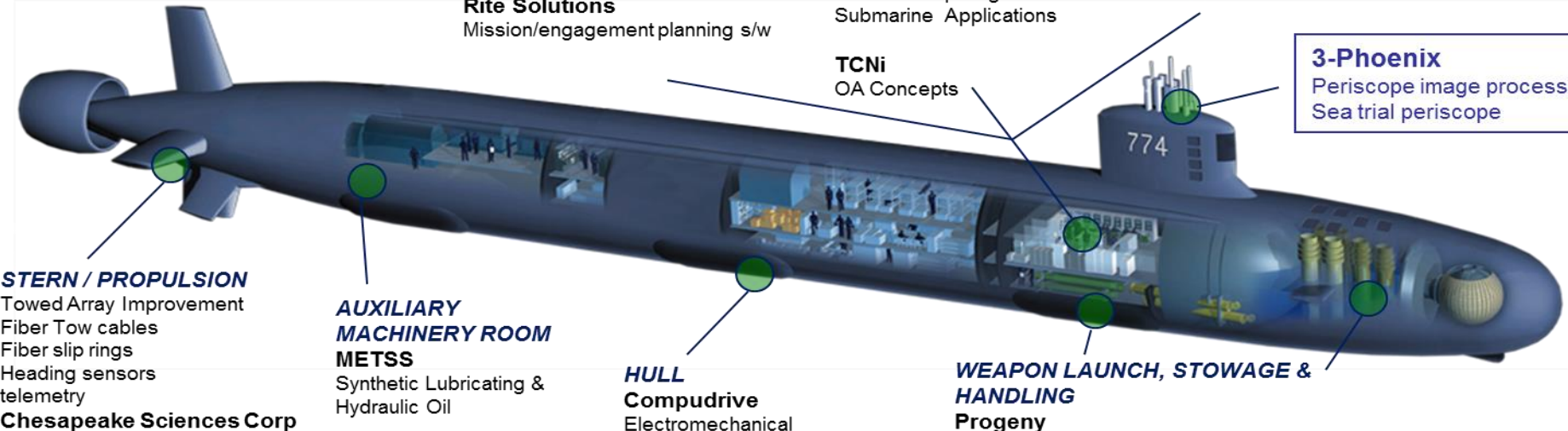
TCNi
OA Concepts

Rite Solutions
Future Combat System Planning
On Board Team Trainer

Chesapeake Science Corp.
TSMS Telemetry

Jackpine Technologies
Common Submarine Radio Room Software

3-Phoenix
Periscope image processing
Sea trial periscope



STERN / PROPULSION
Towed Array Improvement
Fiber Tow cables
Fiber slip rings
Heading sensors
telemetry
Chesapeake Sciences Corp

**AUXILIARY
MACHINERY ROOM
METSS**
Synthetic Lubricating &
Hydraulic Oil

HULL
Compudrive
Electromechanical
Actuators

Seeman Composites
Non-Autoclave Composite
Systems and fairings

AAC
Acoustic sensors

Sedna
HF Sim/Stim

**WEAPON LAUNCH, STOWAGE &
HANDLING**
Progeny
Tools for VME Interactive
Acoustic Analysis Process
Multi Tube Weapon Simulator
Common Weapon Launcher
Pacific Engineering Inc. (PEI)
Ready Stow Group (RSG) Launch
Cradle

TRI
Composite Torpedo Room Temp
Berthing and weapon handling cradles

MK54 Mod 1 Array

SBIR Reasons:

1. Risk reduction
2. Technology insertion
3. Obsolete component replacements
4. Establish competition where there is none



Team SUB Small Business Advocates

Code	Program	Phone
SUBCO	Program Support	202 781 5239
SUB I	International Programs	202 781 1348
SEA073	Undersea Technology	202 781 1216
SEA07TR	Submarine Training Systems	202 781 5184
PMS391	Submarine Escape & Rescue	202 781 3148
PMS392	Strategic/Attack Submarines In Service	202 781 1190
PMS394	Advanced Undersea Systems	202 781 7456
PMS397	COLUMBIA Class	202 781 5141
PMS399	SOF Undersea Mobility	202 781 4125
PMS401	Submarine Acoustics	202 781 1192
PMS404	Undersea Weapons	202 781 1662
PMS415	Undersea Defensive Systems	202 781 5147
PMS425	Submarine Combat Control	202 781 0928
PMS435	Submarine EW and Imaging	202 781 2821
PMS450	VIRGINIA CLASS	202 781 1318
PMS485	Maritime Surveillance Systems	619 524 7653

Contact the TSUB DAC office if you have trouble contacting individual PMOs.
DAC POC: Angelle Dent-King; angelle.l.dent-king3@navy.mil



Small Business Entry Opportunities

- **Long Range Acquisition Forecast (LRAF)**
 - POC Rich Goff, SEA02CI (202) 781-2872
 - www.fedbizops.com
- **Undersea Technology Other Transaction Authority (OTA)**
 - POC Tom Carroll (401) 832-369
 - www.underseatech.org
- **Small Business Innovative Research (SBIR)**
 - Team SUB Coordinator, Brian Quarles, 202-374-5190
 - <https://www.navysbir.com/index.html>
- **DoN Rapid Innovation Program**
 - Team SUB Coordinator, Brian Quarles 202-374-5190
 - www.fedbizops.com



Small Business Investment

- **Significant success stories with SB taking on major system work**
 - PMS 425 (Combat Systems and IA)
 - PMS 404 (Torpedoes)
- **There is opportunity for innovative solutions in the sustainment lane in our system offices which often sustain their own products.**
- **\$2B in contract value over the FYDP**
- **Around 13% of our system level contract dollars are invested in small business**
- **Significant effort over the years in the PEO to utilize SB set aside and major systems work has gone to vendors**
- **There will be continued Small Business awareness events with TSUB in the future such as this showcase**
 - FY21 Goal – Small Business meetings throughout the year to discuss company capability and our system challenges in smaller forums



Small Business Investment (cont.)

- **More Other Transaction Authority (OTA) is being utilized in the PEO**
 - Compliance requirement (2371b) has two of the four that encourages small business (any one of the four can satisfy the requirement with two focused around SB below)
 - Significant role for Non-Traditional Defense Contractors (NDC)/Non-Profit
 - All participants are small business to include SBIRs
 - Consortia based focus: 7 Program Offices with \$350M in efforts to various vendors to include some small businesses
 - Expecting our SB numbers to go up in future years due to more use of OTs and new requirements
- **Commercial Technologies for Maintenance Activities (CTMA) Program is also another tool (cooperative agreement) that we have used in the past to reach small business (electronics obsolescence in undersea weapons)**
 - Solving sustainment challenges in the PEO as a lot of system program offices are cradle to grave with acquisition
- **More discussion and briefings with the program offices on various programs and consortiums that promote National Development Council (NDC)/SBs**
 - Engaged all senior leadership on the options and benefit of utilizing small business/non-traditional vendors

We are creating more awareness of the alternatives to our offices and leveraging consortiums that are innovation focused and foster an environment that utilizes small businesses.



Team Submarine Directorate Overview

Mr. Michael McClatchey
Executive Director
Undersea Integration & USW CTO



Mr. Michael McClatchey

16 September 2020



Advanced Sub System Developments (073)

PEO SUB 073 is responsible for bridging the gap between the acquisition and the application of a design by the U.S. Navy through testing, demonstration and validation of promising technologies to provide undersea emergent capabilities that are safer, stealthier, and lower cost.

- These designs can come from internal Navy sources, DoD industry partners, and/or small business.
- The major focus is on transitioning technologies to help the Fleet maintain Undersea Superiority.





Small Business Investment Areas (073)

- Corrosion Control
 - Innovative design and coatings
- Maintenance vs Repair
 - Predictive monitoring capability
 - Advanced nondestructive testing
- Physics base modeling / design tools
- Advanced materials (Composites)
- Energy storage
 - Increased energy density
 - Safety monitoring
- Platform acoustic monitoring
- Artificial Intelligence/Machine Learning





Maritime Surveillance Systems (PMS 485)

PMS 485 procures systems which provide tactical cueing and acoustic surveillance of the undersea domain. Vital first link in the U.S. Navy's defense against modern enemy submarines.



Fixed Surveillance



Mobile Surveillance



Deployable Surveillance



USNS ZEUS



SURTASS-E



Naval Ocean Processing Facility



Sustainment Challenges (PMS 485)

Maritime surveillance system component obsolesces and upgrades

- Several critical components have reached End-Of-Life and are provided by a sole source.

EXAMPLE CRITICAL EOL TOWED ARRAY PARTS

Twinline Optical Vibration Isolation Module Hose	Shape Measure Unit (SMU) Node	Heading Sensor	Acoustic Module Hose
Dual Acoustic Node	SMU Amp	Single Line Receive Buffer (SLRB)	Fiber Optic Contacts

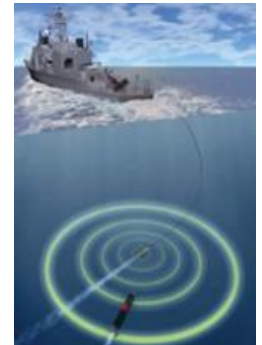
- Deployable surveillance systems refurbishment (DSS)



Undersea Defensive Warfare Systems (PMS 415)

Mission Statement

PMS415 provides the warfighter with decisive, innovative, and affordable undersea defensive warfare capabilities and proactive life cycle support that guarantees combat superiority.



How Can Industry Help?

- NIXIE 25C Fleet Sustainment
 - Maintenance and repair support needed for ~187 systems
 - Will remain in fleet until FY40



Questions





NCMS / CTMA Overview

Debbie Lilu

**National Center for Manufacturing Sciences
(NCMS)**

**Vice President Maintenance and Sustainment
Business Development
CTMA IPT Lead**

(PRESENTATION REDACTED)



Break



Team Submarine Program Office Presentations

Program Office	Time
PMS 391	10:30
NUWC Keyport	10:50
Break	
PMS 404	11:15
IWS 5A	11:30
NWSC Carderock	11:45



PMS 391 – Submarine Escape and Rescue

**Presenter: CAPT. Jonathan Kim /
Steven Thoresen**

Topics:

- **Submarine Rescue Computer System and Micro-Electronic Obsolescence**
- **Additive Manufacturing of Deep Submergence Systems (DSS) Scope of Certification (SOC) Material Control Division (MCD) A Level Parts**
- **Submarine Rescue 3D System Augmented Reality for Maintenance and M&S**
- **Submarine Rescue Fiber-optic Measurement for Launch and Recovery System Loads and Accelerations**
- **Submarine Escape and Rescue Battery-Operated Electronic Sensing of Atmospheric Contaminants**



Submarine Rescue Computer System and Micro-Electronic Obsolescence

Submarine Escape and Rescue (PMS391)

Problem/Hypothesis Statement:

Designed and installed 10-15 years ago, vital computer system and micro-electronics components critical to submarine rescue are now obsolete. Efforts by the program office to procure replacement components to ensure continued viability and resiliency of operations have been exhausted and several components are now considered to be single-point failures with no ability to correct in a timely manner if required. Many of the components are single-source, Commercial off the Shelf (COTS), and company propriety; therefore, the Program Office does not retain intellectual property rights. As such, a complete technology refresh is required to maintain current and future viability of operations.

Technical Approach:

Computer systems and micro-electronics installed in vital system components require re-engineering and/or re-design to ensure these system components remain operational. The computer systems and micro-electronics provide operations of life-support, telemetry, and communications to the Pressurized Rescue Module (PRM) and the Submarine Decompression System (SDS) complex and operations of the Launch and Recovery System (LARS).

Benefit Description:

Providing resolution to the current obsolescence concerns of the submarine rescue computer system and micro-electronics components will reduce the risks to submarine rescue operations and increase the likelihood of a successful submarine rescue evolution. In addition, resolution will result in reducing obsolescence and availability concerns. As a critical support function of the Undersea Warfare Enterprise, the ability to provide rapid submarine rescue is vital to the submarine fleet.

Deliverable:

Reverse-engineered and/or re-designed open-source computer system and micro-electronic obsolete components to allow for continued viability and resiliency of vital submarine rescue operations.



Additive Manufacturing of Deep Submergence Systems (DSS) Scope of Certification (SOC) Material Control Division (MCD) A Level Parts

Submarine Escape and Rescue (PMS391)

Problem/Hypothesis Statement:

Deep Submergence System (DSS) adhere to P-9290 Material Control Division (MCD) Scope of Certification (SOC) requirements. For critical components designated at MCD A, manufacture and certification requires chemical, physical, dimensional verification and traceability requirements. Due to the small number of DSS assets, many components used within the DSS program require special and unique manufacture to meet SOC and mission requirements when manufactured by traditional processes. This results in a small vendor base and high manufacturing, spares and life-cycle costs.



Technical Approach:

Manufacture of statistically representative proto-types for testing to DSS-SOC MCD-A requirements to verify adherence of AM component results compared to traditionally manufactured components. This validation will result in the approval of AM manufactured components to be used on DSS-SOC assets in lieu of traditionally manufactured components.

Benefit Description:

The development and approval of Additive Manufacturing (AM) for use on DSS-SOC MCD A level components will provide reduced manufacture and life-cycle costs, to include reduction in required spares inventory, assembly, and time, as well as alleviating the reliance on unique tooling and one-of manufacturing.

Deliverable:

It is anticipated that at the conclusion of the initiative, there will be government-owned processed utilizing powder-bed fusion and atomic diffusion additive manufacturing that will be approved for use across all Naval Shipyards and Warfare Centers for specialized Naval applications (i.e. DSS-SOC, SUBSAFE Level 1, etc).



Submarine Rescue 3D System Augmented Reality for Maintenance and M&S

Submarine Escape and Rescue (PMS391)

Problem/Hypothesis Statement:

The complex design of the Submarine Rescue System (SRS) and its individual components requires specifically trained maintainers, engineers, and operators in order to ensure efficient maintenance and assembly skills to meet exacting first-time through quality standards.



Benefit Description:

The benefits of supplemental traditional maintenance and design processes with Augmented Reality (AR) to enhance maintainers, engineers, and operators field of view with real-time super imposed digital information to include reduced human error, execution time, breakdowns, downtime, and cost; while at the same time increasing productivity, operation speed, fix rates, compliance, and quality.

Technical Approach:

Develop multimodal 3D AR digital information using existing system 2D CAD drawing and preventative/corrective maintenance procedures to supplement traditional processes and training. This could include preventative maintenance, operator assembly instructions, service inspective instructions, detailed instructions for unfamiliar procedures, compliance checklist, corrective maintenance, service manual instructions, and predictive maintenance.

Deliverable:

The development and implementation of multimodal AR based maintenance and assembly skills to aid in maintenance and modeling and simulation (MS) will accelerated technicians' and engineers' acquisition of new maintenance and design procedures.



Submarine Rescue Fiber-optic Measurement for Launch and Recovery System Loads and Accelerations

Submarine Escape and Rescue (PMS391)

Problem/Hypothesis Statement:

The Launch and Recovery System of the Submarine Rescue System experiences repeated extreme loads to the structural components during launch and recovery operations of the PRM.. These repeated loads result in fatigue to vital components that are difficult to calculate and monitor for potential failure due to the lack of installed sensors and other data-capturing equipment.

Benefit Description:

Providing a means of real time load and acceleration data for the LARS will enable the validation and continued refinement of theoretical model data to better forecast potential failures from fatigue stresses. This may result in the relaxation of current conservative maintenance and component replacement requirements providing total ownership cost savings to this critical and USW core function program.

Technical Approach:

Develop for installation a permanent, light-weight fiber-optic measurement system that may be used to obtain real-time load and acceleration data of key structural components of the launch and recovery system

Deliverable:

The development and installation of a permanent, light-weight fiber-optic measurement system used to capture real-time load and acceleration data.



Submarine Escape and Rescue Battery-Operated Electronic Sensing of Atmospheric Contaminants

Submarine Escape and Rescue (PMS391)

Problem/Hypothesis Statement:

Currently, individual manually operated colorimetric sampling tubes are used in the Submarine Rescue System and onboard a Disabled SUBmarine (DISSUB) to measure trace hazardous substances in the atmosphere. The accuracy of the currently available technology when used at increased pressure (greater than 1.6 ata) is widely disparate and inconsistent.



Technical Approach:

Develop technologies that replace the currently used manually operated colorimetric tubes. Proposed replacement(s) should require only battery power, be portable and multi-use, minimize space and operator input and be capable of providing accurate or scalable results at elevated pressures.

Benefit Description:

Employing different technologies to measure trace atmospheric contaminants will reduce procurement costs, reduce onboard space constraint concerns, reduce spare parts inventory requirements, reduce manpower requirements, and increase the operational availability and resiliency of the Submarine Rescue program.

Deliverable:

Equipment to replace currently used manually operated colorimetric sampling tubes..



Thank You



NUWC Keyport

Presenter: Dr. Aaron Darnton

Topics:

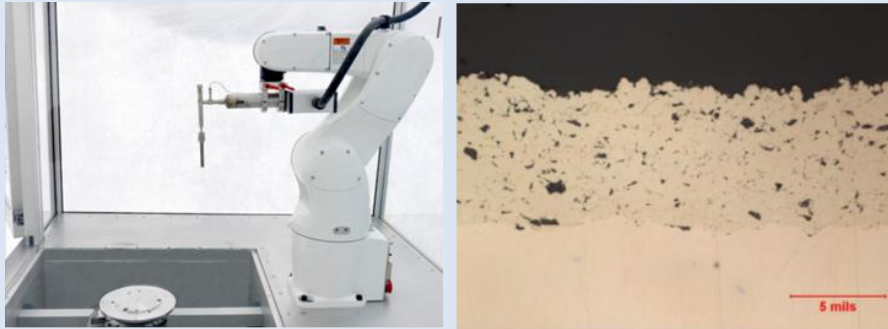
- Cold Spray Additive Repair for Fleet Components
- Metal Powder Bed Fusion Procedure Qualification
- Metal Additive Manufacturing Prep & Process Simulation For First Time Build Success
- Laser Ablation Fatigue Testing
- Integrated Project, Logistic and Production Management Tools



Cold Spray Additive Repair for Fleet Components

NUWC Keyport

Problem/Hypothesis Statement: Cold spray additive metal repair technology has the potential to dramatically improve the repair of worn and corroded naval components. The objective of this project is to investigate and qualify cold spray repairs on selected naval components and materials of interest.



Technical Approach:

- Keyport will collaborate with the Naval Sea Systems Command Technical Warrant Holder (NAVSEA 04), Public Shipyards, Regional Maintenance Centers (RMC), and NSWC Carderock to develop Qualified Spray Procedures (QSPs) for various targeted additive repairs.
- Keyport acquired a shipyard equivalent high pressure cold spray system in FY19 that will be independently evaluated during the project once the system is integrated and operational.
- Keyport will utilize a lab grade low-pressure cold spray system that is currently operational to perform test samples, mock-ups, and repairs until the high pressure shipyard system is operational.

Benefit Description:

- Cold Spray technology is the #1 innovation and technology insertion priority listed in the “Immediate Actions from Public Shipyard Joint Planning and Execution Summit” (NAVSEA Ltr 4700 Ser 00/558, dated: 20 Dec 2018)
- Cold spray technology has the ability to dramatically improve additive repairs of metal components as compared to traditional methods such as epoxy and brush electroplating.
- Cold Spray repairs have been shown in NAVAIR testing to be faster and have better longevity.
- Potential benefit to maintenance operations for all metal construction ships, submarines, aircraft and vehicles.

Deliverable:

- Cold Spray additive repair will be investigated and evaluated by project collaborators using different components and materials of interest to Fleet repair and maintenance applications.
- The project will utilize Keyport’s low-pressure cold spray system and high pressure system for comparison and applicability to different repairs.
- The collaboration team will develop Qualified Spray Procedures (QSPs) for various targeted additive repairs from the test results.

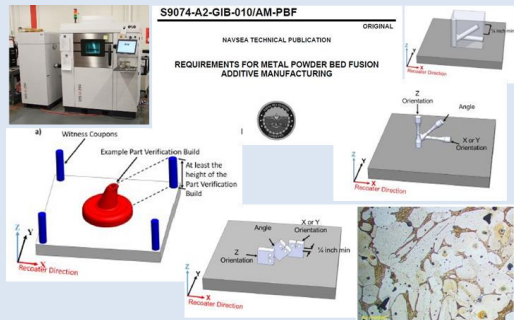


Metal Powder Bed Fusion Procedure Qualification

NUWC Keyport

Problem/Hypothesis Statement:

Keyport will work with Technical Warrant Holders to develop qualified Metal Powder Bed Fusion additive manufacturing / repair procedures and part verification for applications with service condition severity levels 1 through 6 as described in NAVSEA Technical Publication S9074-A2-GIB-010/AM-PBF.



Benefit Description:

- First time use of the new NAVSEA Technical Publication for metal PBF will exercise the process and build the test plan framework for Fleet repairs
- First qualified Metal PBF procedure for Fleet critical service condition parts
- Lessons learned will be shared with other AM activities and best practices for metal part qualification at NUWC Keyport and collaboration partners for the use of Metal Powder Bed Fusion additive manufacturing to support Fleet repair, maintenance, sustainment and readiness requirements.
- Keyport will become the first activity for production of metal parts qualified for applications with service condition severity levels 1 through 6.
- Enables the use of Technical Warrant Holder (TWH) approved 3D metal printing for Fleet repair, maintenance, sustainment and readiness needs.

Technical Approach:

NUWC Keyport will collaborate with the NAVSEA Technical Warrant Holder and NSWC Carderock to prepare written procedures, specimens for qualification of a PBF procedure and specific part verification procedures. This approach consists of:

- 1) Write procedures and submit to NAVSEA for Approval.
- 2) Fabricate test coupons, test specimens, and NDT calibration standards for qualification
- 3) Destructive and nondestructive testing of specimens and calibration standards.
- 4) Part verification printing and testing

Deliverable:

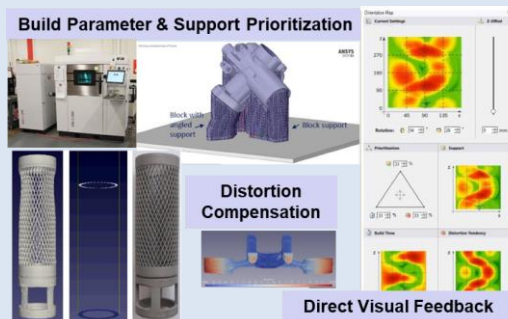
- 1) Write PBF procedures and part verification procedures.
- 2) Produce all specimens and part verification builds.
- 3) Perform all testing for qualification and verification.
- 4) Submit all procedures and test reports to NAVSEA 05T for TWH approval



Metal Additive Manufacturing Prep & Process Simulation For First Time Build Success

NUWC Keyport

Problem/Hypothesis Statement: Implementation and testing of advanced design, model prep, build prep, and simulation software tools for metal additive manufacturing (AM) that integrates directly with existing metal printers to increase build success rates by 25-50% and greatly expand utilization of this technology to a broader range of critical Navy/DoD logistics, maintenance and repair uses.



Benefit Description:

- Improved printability: Enables superior build processes to produce quality end-use 3D printed metal parts the first time, at lower cost, with less lead time.
- Distortion compensated part model generation will reduce build failure and interaction, saving significant cost, labor hours and delivery time per build.
- Distortion compensated models can be shared across the AM enterprise to ensure first time success for follow-on builds at partner and collaboration sites.
- Results will be used in all design-for-additive manufacturing (DFAM) best practices at NUWC Keyport and collaboration partners.
- Efforts will enable rapid fielding of complex 3D printed metal components to Fleet (direct) and reach-back support of deployed "AM At-Sea" technology.

Technical Approach: NUWC Keyport will procure, evaluate, and implement COTS software package that optimizes 3D-printing of complex geometries while avoiding costly build failures and part distortion. Approach will include:

- 1) Clean / repair models and analyze printability before printing.
- 2) User prioritization of support minimization, build time, and distortion tendency with instant visual feedback prior to build setup.
- 3) Build simulation with auto distortion corrected model capabilities.
- 4) Validation through printed part verification.

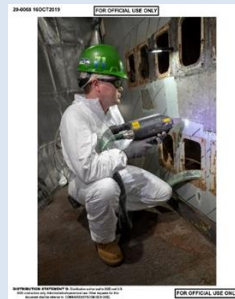
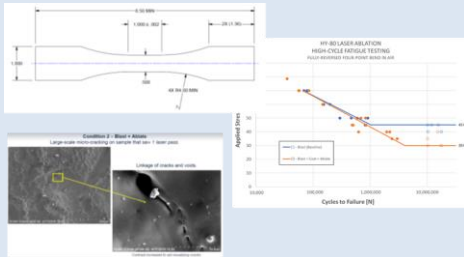
Deliverable: Procure COTS software, integrate with metal AM machine to evaluate capabilities and first pass quality improvement. Demonstrate metal fabrication of Navy applications to validate capability for use of metal 3D printing in Fleet logistics, sustainment, repair, readiness and maintenance requirements.



Laser Ablation Fatigue Testing

NUWC Keyport

Problem/Hypothesis Statement: Much of what is known about fatigue effects from the use of laser ablation has focused on pulsed Nd:YAG laser technology. There is a need to research different laser technologies (CW, pulse closed-loop control, etc.) to see if the same fatigue debit is present these samples as well.



Technical Approach: There is current test data showing a fatigue debit on fully reversed 4-point bend test specimens. An AoA of technologies will be completed to down select the different aspects to be included. This test will correlate the axial fatigue data derived with the existing bending fatigue data being completed by NSWC Carderock.

Benefit Description:

- Maintenance costs for preservation activities is increasing with age of ships, submarines and aircraft. Conventional methods such as needle guns, mechanical chipping, etc. for coating removal and preservation is not sustainable to meet operational availability requirements. Length of maintenance availabilities will increase. The use of lower impact laser ablation

- **Deliverable:** This project would perform a brief market and DoD (AF-RSO, NAVAIR, etc.) partner survey to determine alternative technologies in the laser ablation coating removal space.
- The most viable (TRL 8+) would then be selected to prepare a samples set for fatigue characterization.
- The data would then be compiled with reference to the original fatigue characterizations for comparison.



Integrated Project, Logistic and Production Management Tools

NUWC Keyport

Problem/Hypothesis Statement: Project plans to integrate disparate project / production management tools, such as Shop Workload Management System (SWMS), APCS, Atlassian, MS Office, etc into a set of command level tools that are compatible with NAVSEA business tools (primarily SAP ERP), and Model Based Product Support for improved efficiency, resource allocation and data analytic employment



Benefit Description:

- Cost to “swivel chair” between existing tools estimated at \$8 million per year in ONE Department, at ONE Warfare Center. Anticipated savings to NAVSEA and NAVSUP are more than an order of magnitude greater than investment.

Technical Approach:

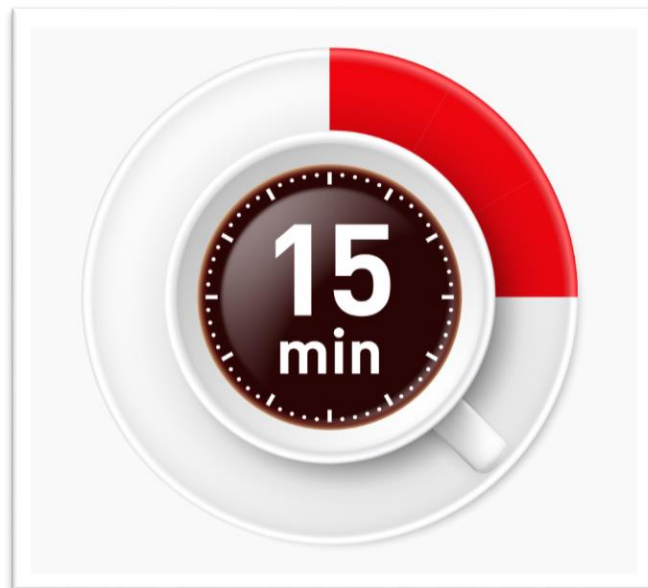
- Project will engage in an analysis of requirements and alternatives, evaluate those alternatives for applicability at the Keyport Command level, as well as the NAVSEA Enterprise level.
- Project will acquire a set of tools, adapt them to Keyport’s production and project environment for one project in each of the Keyport Maintenance, Engineering and Industrial Operations (ME&IO) Divisions.
- Project will then evaluate tools for potential implementation across the Command and Enterprise, and develop a transition strategy.
- Project will collaborate primarily with NAVWAR PMW-150 for integration with Model Based Product Support (MBPS) modules such as NMMES and NOBLE

Deliverable:

- Year 1:** Analysis of Requirements and Alternatives, Acquisition Package
- Year 2:** License procurement and user interface development
- Year 3:** Implementation, evaluation and transition strategy



Thank You



Break



PMS 404: Undersea Weapons

Presenter: Mr. Dave Harrelson TMC (SW) Ret.

Topics:

- **Electronics Obsolescence**
- **Metal Treatments and Coatings**
- **Test Set improvement and obsolescence**
- **Additive Manufacturing**



Electronics Obsolescence

PMS 404 Undersea Weapons Program Office

Problem/Hypothesis Statement:

Many of the electronic devices in our torpedoes and test equipment are reaching end of life, and many are no longer supported through normal supply. Many of the OEM's are no longer manufacturing these items resulting in reduced ability to maintain our systems.

Benefit Description:

New and improved electronic devices that meet/exceed our requirements reduces the need to upgrade our inventory to overcome the constant obsolescence issues, and could reduce the overall parts inventory footprint.

Technical Approach:

Provide technical review of drawings/circuit cards/test equipment and develop possible solutions for reducing the electronic obsolescence issues within our programs.

Deliverable:

Innovative methods of reducing the impact of obsolescence of aging electronics in our weapons systems and test equipment. The solution should have long term supportability.



Metal Treatments and Coatings

PMS 404 Undersea Weapons Program Office

Problem/Hypothesis Statement:

The Torpedo program experiences large losses in parts each year due to corrosion. The coating material we currently use is an Anodize solution which has hazardous properties.

Benefit Description:

A non-toxic corrosion resistive coating would reduce the exposure of personnel to potential hazards associated with the current anodizing methods. It could also be applied outside of the normal demand-air breathing workshop area's by any qualified technician.

Technical Approach:

Develop a non-toxic corrosion resistant coating that can be applied to 7000 series aluminum, both to large surfaces as well as a method of applying simple touch-up to minor scratches when needed.

Deliverable:

Develop an non-toxic corrosion material for 7000 series aluminum that has similar corrosion preventive traits of current anodizing materials.



Test Set Improvement and Obsolescence

PMS 404 Undersea Weapons Program Office

Problem/Hypothesis Statement:

Some Torpedo Test Equipment is reaching end of life and many are no longer supported through normal supply. Many of the OEM's are no longer manufacturing these items resulting in reduced ability to maintain the systems. Some of these systems have outdated technology incorporated, including software that is no longer supported.

Benefit Description:

New or improved electronic devices that meet/exceed our requirements reduces non-operational equipment and could reduce the obsolescence issues, and could reduce the overall test equipment inventory footprint.

Technical Approach:

Provide technical review of drawings/circuit cards/test equipment and develop possible solutions for reducing the obsolescence issues within our program. Potential to combine like systems into multi-functional systems that could support more than one functional area. Updating older analog systems to newer digital technology could also provide a long term solution.

Deliverable:

Innovative methods of reducing the impact of obsolescence of aging hardware and electronics in our test equipment, potentially combining systems to be able to perform multiple weapons systems test. The solution should also include capability to support software upgrades and compliance with current cybersecurity requirements.



Additive Manufacturing

PMS 404 Undersea Weapons Program Office

Problem Statement:

There is untapped potential for Navy, national labs, universities, and industry to collaborate on sustainment related efforts on a larger scale while exploiting current public and private infrastructure, intellectual capital, all while lowering boundaries to entry and maintaining or decreasing fixed costs.

Oak Ridge National Lab

168 industry partners
Co-locate with industry
On-site training
DOE funded / DOD partner
Stimulator of private sector



Universities (Penn State)

Innovative w/ rotating PhDs
Undersea weapons office
Rapid prototyping
Computational analysis & simulation
Manufacturing process development

Small Business/Industry
Expansion potential
Variable costs
Shared risks
Efficient capitalists



Issue & Benefits Description:

Known Issue: A GAO audit conducted in April 2018 reported that the DOD expects to invest \$1.66 trillion to develop and procure its portfolio of 86 major defense acquisition programs. Congress and DOD are trying to improve how major weapon systems are acquired because many programs fall short of cost, schedule, and performance goals. This often leads to the DOD paying more than budgeted, producing less than expected, and occasionally having to make capabilities sacrifices.

Collaboration Benefits:

1. Mitigate financial risk to small businesses trying to enter the defense sector
2. Leverage in-place advanced labs and evolving manufacturing technologies
3. Prevent proprietary processes = more efficiency and competition
4. Counters inconsistent DOD funding, sporadic demand, lessens small business upfront investment and increases lower risk profit

Technical Approach:

- Statement of Work (SOW) in place with Penn State and ORNL for assistance improving production approaches, reverse engineering, improving technical data, drawings, injection molds, identifying cheaper materials such as composites that might be both more durable and more easily produced, etc.
- Labs and universities provide material testing results, later confirmed by government
- Hybrid manufacturing with 3D printing + machining, and injection molds if acceptable
- Building a network of government Engineers, Tech. Warrant Holders, national laboratories, university contacts, and logisticians to share knowledge and improve processes while ensuring government needs are met while keeping small businesses profitable

Deliverable Example:

- Lightweight propeller reverse engineering effort currently in-progress
- Government investing into updating drawings, tech. data, molds if needed, manufacturing lessons learned / recommendations, etc. Shared cost and risk.
- Current cost approximately \$10k each for frequently disposed of propellers, expected new cost of \$1,000 per propeller





Thank You



IWS 5

Presenter: Meg Stout, IWS 5 S&T Lead

Topics:

- **Non-invasive anti-fouling assessment**
- **Composite materials replacement for aging HM&E items**

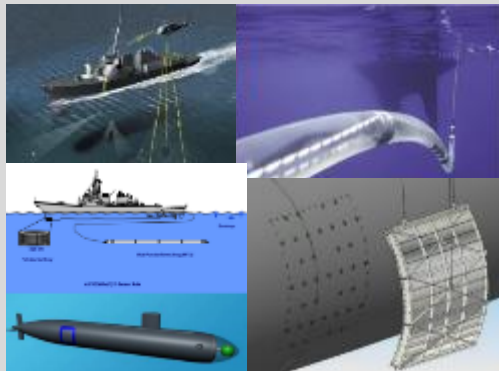


ANTI-SUBMARINE WARFARE (ASW)

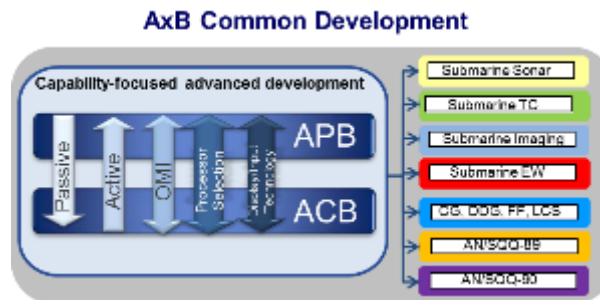
FOCUS AREAS



Sensors



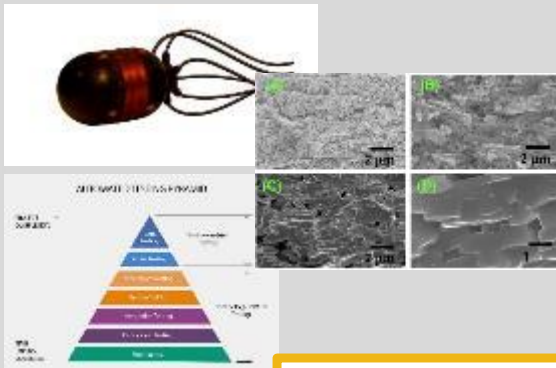
Processing & Displays



Theater Wide Situational Awareness



Affordable Production



Training



C2 & Comms



Maintaining ASW Superiority Against Revolving World Threats



Non-invasive Anti-fouling Assessment

IWS 5.0: Undersea Warfare Systems

Problem/Hypothesis Statement:

Undersea sensors and fairings experience degradation associated with marine bio-fouling.

Some traditional anti-fouling materials are no longer appropriate due to environmental impact or human harm



Fouled electric cable in a canal (Mid-Deûle in Lille, north of France)

Benefit Description:

A non-invasive Anti-fouling capability, based on thorough assessment of available technologies and their applicability, could materially extend useful sensor performance between cleanings.

Technical Approach:

Conduct exploratory survey to determine key problems with current state for hull-mounted sensors

Develop proposed anti-fouling solutions for approval to manufacture

Create samples for testing

Deliverable:

Initial product will be a comprehensive survey of available technologies for sonar domes, followed by demonstration of performance for selected technology(ies)



Composite Materials Assessment

IWS 5.0: Undersea Warfare Systems

Problem/Hypothesis Statement:

For some metal parts, industrial base has either limited capacity or facilities and skills are projected to go away

Composite materials, where appropriate, may be lighter, less subject to corrosion, allow embedding of sensors or anti-fouling, and may reduce the need for paint



Benefit Description:

Composite replacements for metal parts can alleviate critical parts shortages as well as reduce weight and improve performance

Use of composites can also facilitate concepts that are not feasible if made using traditional metal techniques

Technical Approach:

Work with Navy to identify candidate part(s) for composite exploration

Perform analysis to demonstrate composite is suitable replacement

Build samples for test to validate analysis

As appropriate, build replacement part(s)

Deliverable:

Survey of parts where composite replacement supports high return on investment

Analysis of suitability of composites for key part(s)

Test report regarding validity of analysis

As appropriate, replacement part(s)



Thank You



NSWC Carderock

Presenters:

- Hull Treatment – Advanced development | *Dr. Scott Kasprzak*
- Closed loop CNC tool path planning for the additive manufacture of complex geometries | *Chris Hoerbelt*
- Additive manufacturing of high quality fasteners | *Chris Hoerbelt*
- Non-destructive test methods for the inspection of interior surfaces and complex geometries | *Chris Hoerbelt*
- Commercial gas sensor technology to provide early battery (e.g. UUV) fault detection | *Clint Winchester*
- Seawolf Class submarine Ship Control System (SCS) and Data Distribution System (DDS) displays | *George Brodie*



Hull Treatment – Advanced Repair Development

PEOSUB 073

Problem/Hypothesis Statement:

Special Hull Treatment (SHT) on Virginia Class submarines requires regular repair and replacement both pierside and in dry dock. Repairs must be executed quickly, according to established Navy procedures, and be of high-quality.

Sustainment & Obsolescence Issues with existing components:

- Repair adhesive is unique to Navy and has supply chain risk
- Current repair method is long and labor-intensive: hand template missing area and cut tiles to suit
- Limited in-situ quality assurance testing



Technical Approach:

- Execute a Commercial Technologies for Maintenance Activities program for SHT repair.
- New method/materials would meet repair manual and Technical Warrant Holder requirements while reducing risk
 - Automated process for sizing and cutting of tiles
 - Commercial adhesives
 - Additional QA testing on quality of repair work (could also be applied to surrounding areas to determine risk for nearby SHT failure)

Benefit Description:

A Commercial Technologies for Maintenance Activities (CMTA) program effort would address a foreseeable problem with sustaining warfighter readiness for the life of the Virginia Class.

The current method for executing SHT repairs is time-consuming and labor-intensive. If repairs cannot be executed quickly and properly, the submarine goes on its next mission without the treatment. Automating much of the process could make repairs faster, more accurate, and of higher quality.

Additionally, identifying additional adhesives that meet stringent Navy requirements would reduce reliance on a Navy-specific formulation that has recently shown supply-chain risk.

Finally, additional quality assurance (QA testing) on the strength and quality of the repair will highlight improper repairs, improve understanding of repair methods and requirements, and eventually reduce the need for future repairs.

Deliverable:

Include short statement of product to be developed and how it meets customer requirements.

Final product would be a fully tested and demonstrated SHT repair method and hardware that meets repair manual and TWH requirements while fulfilling as many of the goals as possible: 1) automate the repair process, 2) use commercial adhesives, and 3) improve QA frequency and applicability.



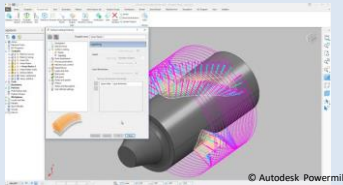
Path Planning and Closed Loop Control for Additive Manufacturing

NSWCCD

Problem/Hypothesis Statement:

Additive manufacturing technologies are rapidly advancing. Application of those technologies to components with complex geometries often requires significant time investment (non-recurring engineering) to generate toolpaths in addition to multiple additive build iterations to tune the toolpaths to the specific additive process which typically have open loop control.

A flexible, robust solution for path planning and a compatible closed loop control system are needed to allow rapid application of additive manufacturing technologies to components with complex geometry.



Benefit Description:

Industry needs the ability to leverage additive manufacturing technologies for new applications. Many applications contain complex features and geometries which require a significant up front investment in order to implement additive technologies.

A robust path planning tool coupled with a closed loop control solution applicable to multiple additive manufacturing technologies will allow industry to use additive manufacturing in more applications.

The NAVY can reap cost and schedule savings in new production components and repair/refurbishment applications if industry can leverage additive manufacturing techniques in a robust fashion for a variety of components without large up-front investment in non-recurring engineering for each application.

Technical Approach:

Develop a path planning tool by leveraging existing commercial platforms or develop a new platform that creates robust toolpaths for a variety of additive manufacturing technologies.

Develop a closed loop control strategy including sensors and hardware that is modularly designed such that it can be installed and used on a variety of additive manufacturing platforms.

Deliverable:

- Adaptable path planning tool (software)
- Closed loop control system (hardware & software)

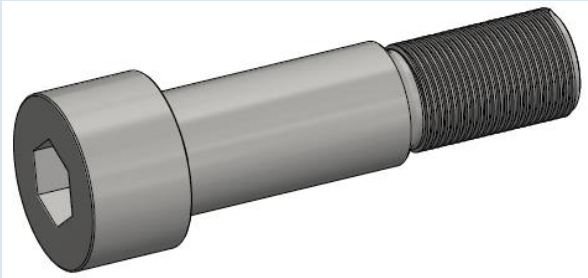


Additive Manufacturing of High Quality Fasteners

NSWCCD

Problem/Hypothesis Statement:

Manufacturing high quality custom fasteners from naval materials using current manufacturing techniques is a high cost and long lead time activity. Potential to reduce cost and decrease manufacturing lead time exists with the application of additive manufacturing techniques to fasteners.



Technical Approach:

Leverage additive manufacturing techniques to replace wrought input materials with long lead times or high cost with lower cost or more readily available input materials. Utilize additive processes to produce high quality custom fasteners that meet stringent fastener requirements.

Benefit Description:

Material types, quantity, and sizes required for NAVY fasteners often have limited availability and/or require special orders (e.g. mill run) from material suppliers leading to long manufacturing lead times. Fastener manufacturing also typically requires capital intensive fastener specific tooling in order to manufacture the fasteners.

Such a capability also allows industry to support manufacturing of a wider range of fastener materials and geometry with a smaller capital input cost

Successful application of additive manufacturing techniques to custom NAVY fastener manufacturing would allow the use of more readily available input materials thereby reducing manufacturing lead times and cost.

Deliverable:

- Process or approach to produce high quality custom fasteners with additive manufacturing processes.
- Several manufactured articles and testing result objective quality evidence which demonstrates that the additive process or approach results in high quality custom fasteners

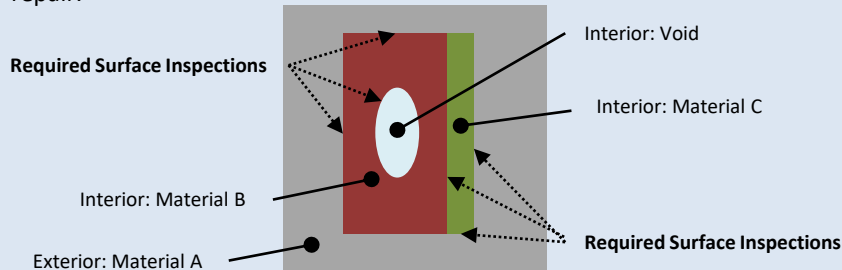


Non-Destructive Test Methods for Interior Surfaces and Complex Geometries

NSWCCD

Problem/Hypothesis Statement:

Multi-material and other complex structures that have material interfaces or internal surfaces inaccessible to direct inspection techniques. There are potential benefits in naval applications in using these types of structures, however in order to effectively utilize these structures in shipboard applications it is necessary to have a robust technique to inspect them to support proper maintenance and repair.



Technical Approach:

Develop an inspection technique leveraging current inspection technologies or develop a new inspection technology to accurately assess interior surfaces / material interfaces.

Validate technique through the inspection of demonstration articles that are subsequently destructively inspected to verify non-destructive inspection technique results.

Benefit Description:

An accurate inspection technique with robust application usage that resolves interior surfaces/interfaces and bulk material defects allows the design and use of complex structures that cannot be reliably inspected with current inspection techniques. Use of such structures is applicable in commercial and naval applications.

Deliverable:

- Inspection technique including instruction, software, and hardware that performs the desired interior surface/material interface inspections.
- Objective quality evidence demonstrating that the inspection technique and system achieves the desired inspection accuracy.



Gas Sensors for Unmanned Undersea Vehicle Energy Source Off-Gassing Mobile Detection

NSWCCD

Problem/Hypothesis Statement:

Special purpose energy storage and power generation systems planned for Unmanned Undersea Vehicles (UUV) may pose both casualty and non-casualty hazardous off-gas and material contamination. Materials in question include organics and inorganic constituents of advanced power and energy systems including lithium and lithium-ion batteries. Some of the constituent materials potentially released need local detection at the parts per billion (PPB) level.



Technical Approach:

A detection system should be programmable for various levels of sensitivity and exposures and not be subject to “sensor spoofing” or contamination by exposed gases in a normal or compromised environment. Gases and materials to be detected include open literature known constituent of lithium and lithium-ion batteries as well as known and plausible casualty releases. Trade space for portability and flexibility should be assessed as well as current allowed limits for materials under the Navy atmosphere control criteria for submarine crew spaces and machinery spaces. Miniaturization and SWaP assessment should address possibility on internal housing in UUV hull systems.

Benefit Description:

A portable precision sensor capable of identifying and alerting to anomalous gases and materials released of concern for release into platform atmospheres will enable both UUV husbandry and other system using specialty energy sources and power generation systems.

For example most lithium-ion batteries do not meet the criteria of hermetically sealed outside of the next level assembly. Maintenance of stationary or potable systems using this power source may expose personnel and equipment to materials off-gassed or released.

Ability to detect contaminant at pre-action levels will enhance advanced and exotic power and energy source implementation aboard Navy platforms/

Deliverable:

Final product would be a fully tested portable gas and material detection system capable of identifying desired species of gases and particulate at the appropriate level (e.g. micrograms/meter-cube) with near immediate alert user of detection. System should be capable of being operated in conditions across the Navy platform space and imposed environments.



SEAWOLF CLASS SHIP CONTROL SYSTEM DISPLAYS

PMS392

Problem/Hypothesis Statement:

The Seawolf Class Fly-By-Wire Ship Control System(FBW SCS), Data Distribution System(DDS) and Weapons Stowage & Handling (WS&H) utilize touch screen flat panel displays that can be certified as Safety Flight Critical Components (SFCC) as well as Grade A shock certified.

Sustainment & Obsolescence Issues with existing components:

- Supplier/Vendor acquired and no longer supports
- No SFCC certified repair facility
- No support for parts obsolescence
- Limited on-hand supply for replacements
- Cybersecurity requirements/compliance



Benefit Description:

A Technical Refresh program effort would address a foreseeable problem with sustaining warfighter readiness for the life of the Seawolf Class.

The existing displays cannot be repaired and certified per the SFCC requirements. If a SFCC repair facility were stood up to support the existing displays, parts availability for repair/replacement would still be a problem as some internal components are already obsolete.

Cybersecurity requirements/compliance was not designed into the existing components for sustainability. A tech refresh would include designing in the ability to satisfy the shipboard system cybersecurity requirements.

Technical Approach:

- Execute a Technical Refresh program for the existing display.
- New display would be form, fit, and functional replacement.
 - Touch screen display
 - 1553 data bus interface
 - RS422 interface (external keypad input)
 - Standard 120VAC power
 - Satisfy environmental qualification testing (EQT) requirements
 - Satisfy cybersecurity requirements/compliance
- New supplier/vendor will stand up and maintain a SFCC certified repair facility for supportability.

Deliverable:

Final product would be a fully tested touch screen smart display that is a form, fit, functional equivalent to the current SEAWOLF SCS, DDS, WS&H tactical displays, meeting all EQT/cybersecurity requirements and are fully sustainable with the creation of a SFCC certified repair facility.



Thank You



Team SUB SBST Showcase Follow-up

- Additional questions or comments regarding the Team SUB FY20 SBST Showcase can be addressed by the following POCs:

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- Technical Directory of Small Businesses and Technology Abstracts available at CTMAs website:

<https://www.ncms.org/events/small-business-sustainment-technology-showcase/>



Thank you

End of Day 1 Session